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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/774,454	02/10/2004	Takao Saito	811_106	9153

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EXAMINER	
TUROCY, DAVID P	
ART UNIT	PAPER NUMBER
1792	
MAIL DATE	DELIVERY MODE
03/27/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/774,454	SAITO ET AL.	
	Examiner	Art Unit	
	DAVID TUROCY	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 March 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 5-8* is/are pending in the application.

4a) Of the above claim(s) *5-7* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/5/2008 has been entered.

Response to Amendment

2. Applicant's amendments filed 3/5/2008, have been fully considered and reviewed by the examiner. The examiner notes the amendment to claim 1 and the cancellation of claim 4. Claims 1-3, and 5-8 remain pending with claims 5-7 withdrawn due to a restriction requirement.

Response to Arguments

3. All the Applicant's arguments filed 3/5/2008 have been fully considered but they are deemed moot because they are directed to newly added limitations that were not present at the time of the prior rejection. These limitation will be addressed in the prior art rejection that follows.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 11-12735 by Yara et al, hereinafter Yara alone or further in view of "Deposition of thick diamond films by pulsed d.c. glow discharge CVD" By Hartmann et al. or "DLC films formed by hybrid pulse plasma coating (HPPC) System" by Awazu et al.

Claim 1: Yara discloses a method of producing a thin film using opposing electrodes by applying a pulse voltage to opposing electrodes under a pressure within the claimed range and under an atmosphere comprising a gaseous raw material including a carbon source to generate discharge plasma so that a thin film is formed on a substrate. (see for example abstract, paragraphs 0008-0013, figures). The pulse has a duration 1000 nanoseconds (0011). A *prima facie* case of obviousness exists where the claimed ranges and prior art do not overlap but are close enough that one in ordinary skill in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 f.2d 775, 227 USPQ 773 (Fed. Cir. 1985). See MPEP 2144.05. Specifically, one of ordinary skill in the art would deem 1000 nanoseconds to have similar properties to that with a 999 nanosecond pulse duration.

As for the requirement of Raman spectrum. The examiner notes the film deposited by Yara is diamond like carbon (0013), and the process as taught by Yara disclose the pulsed plasma deposition and the prior art and the present claims, reflected by claim 1, teach all the same process steps and thus the results obtained by applicants process must necessarily be the same as those obtained by the prior art. Therefore by pulsed plasma process, it must necessarily result in the claimed Raman spectrum. Either 1) the applicant and the prior art have different definitions for DLC films, or 2) the applicant is using other process steps or parameters that are not shown in the claims. Specifically, it is the examiners position that a DLC film deposited at 999 ns pulses will necessarily have the same Raman spectrum as that deposited at 1000 ns.

Yara discloses depositing a DLC coating layer by pulse deposition and discloses a Raman spectrum peak at 1332 cm^{-1}, however, fails to explicitly discloses a broad peak at about 1580 cm^{-1} and a shoulder peak between 1300-1500 as required by the claim. However, Hartmann and Awazu disclose the Raman spectrum of deposited films. Hartmann discloses a DLC films are measured using Raman spectrum, including a diamond peak at 1332 cm^{-1} and a broader peak at 1550 cm^{-1} (which can be considered about 1580 cm^{-1} as required by the claim) (Figure 4 (d), page 854). Additionally, Hartmann discloses the DLC Raman spectrum is adjusted by varying the gas phase concentrations (page 854). Additionally, Awazu discloses DLC films deposited have a broad peak around 1590 cm^{-1} and a peak around 1360 cm^{-1} (page 173). Additionally, Awazu, at figure 3 and 4, discloses such Raman spectrum for a

deposited DLC film using a plasma includes the peaks as claimed by the applicant and discloses adjusting the gas flows to achieve the desired Raman spectrum (175).

Therefore, the evidence suggests that the process of Yang, which deposits a DLC layer, must have a similar Raman spectrum as taught by Hartman and Awazu as associated with DLC deposited layers, that is a diamond peak at 1332 cm^{-1} (that addressed in the disclosure of Yara) accompanied by a broader peak at 1550 cm^{-1} or 1590 cm^{-1} (which can be considered about 1580 cm^{-1} as required by the claim).

At the very least, Harmann and Awazu disclose known and suitable Raman spectrums for deposited DLC layers and both disclose adjusting the ratio of the gases to deposit the DLC with the desired Raman Spectrum. Therefore, taking the references collectively, it would have been obvious to one of ordinary skill in the art to have adjusted the process parameters in the process of Yang to achieve the predictable and desired Raman spectrum. A predictable use of prior art elements according to their established functions to achieve a predictable result is prima facie obvious. See *KSR Int'l Inc. v. Teleflex Inc.*, 127 S Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007).

Claim 2. The pulse voltage of Yara has a pulse rise time of 1000 nsec or shorter (0010).

Claim 3. The pulse voltage of Yara has a pulse fall time of 1000 nsec or shorter (0010).

6. Claims 1-4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 11-12735 by Yara et al, hereinafter Yara and further in view of "Characterization of Ultra-Short pulsed Discharge Plasma for CVD processing" by Mizuno, hereafter Mizuno.

Yara is applied here for the all the same reasons as set forth above and the examiner maintains the position as set forth above. However, Mizuno discloses that in order to achieve an active control of plasma using pulse duration of less than 1 ms (1000 ns). Mizuno discloses that such active control of the plasma structure in space and time allows for optimum reaction filed and controlling the ions and radicals life time. (page 656). Mizuno discloses using a high voltage in combination with pulses of 50-1000 ns duration without any plasma non-uniformity or arcing because voltage amplitude falls to zero before glow to arc transition (abstract).

Therefore, taking the references collectively, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Yara by providing high voltage pulses of 50 - 1000 ns as suggested by Mizuno to reap the benefits of providing active control. Please note that the test of obviousness is not an express suggestion of the claimed invention in any or all references, but rather what the references taken collectively would suggest to those of ordinary skill in the art presumed to be familiar with them (*In re Rosselet*, 146 USPQ 183).

Additionally, the claim would have been obvious because the technique for improving particular methods was part of the ordinary capabilities of a person of ordinary skill in the art, in view of the teaching of the technique for improvement in other

situations. See *KSR Int'l Inc. v. Teleflex Inc.*, 127 S Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007).

As for the requirement of Raman spectrum. The examiner notes the film deposited by Yara is diamond like carbon (0013), and the process as taught by Yara in view of Mizuno disclose the pulsed plasma deposition with pulses in the range as claimed. Therefore, since the prior art and the present claims, reflected by claim 1, teach all the same process steps, the results obtained by applicants process must necessarily be the same as those obtained by the prior art. Therefore by pulsed plasma process, it must necessarily result in the claimed Raman spectrum. Either 1) the applicant and the prior art have different definitions for DLC films, or 2) the applicant is using other process steps or parameters that are not shown in the claims.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Tither et al. "Application of diamond-like carbon coatings deposited by plasma-assisted chemical vapour deposition onto metal matrix composites for two-stroke engine components" (entire reference) and Tither et al. "Hybrid plasma CVD of diamond-like carbon (DLC) at low temperatures" (1932-1933) disclose DLC Raman Spectrum similar to that as claimed by the applicant.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID TUROCY whose telephone number is (571)272-

2940. The examiner can normally be reached on Monday-Friday 8:30-6:00, No 2nd Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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